Patent Application of

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for

TITLE: SCOLL SAW TABLE INSERT BLADE POSITIONER

CROSS-REFERENCE TO RELATED APPLICATIONS

Not Applicable.

FIELD OF THE INVENTION

This invention relates to a table insert for a scroll saw.

BACKGROUND OF THE INVENTION

Scroll saws are known in the art and include upper and lower arms extending forwardly from a housing. Blade clamps are disposed at the forward ends of the arms and each clamp secures one end of a generally vertically disposed blade. The blade extends through a hole in a workpiece support table. The blade is reciprocated in a generally vertical plane to achieve a precise cutting action, for example, by simultaneously reciprocating the arms in a vertical plane. Such scroll saws may be utilized to make both straight line and curved cuts in rather intricate patterns and shapes in a variety of sheet like materials including wood, metal, plastic and the like. Generally the teeth of the blade are so shaped such that the blade cuts only on the down stroke.

The scroll saw table necessarily has an aperture to allow for the blade to pass through the plane of the table. Generally the aperture is larger than necessary to allow for different blade sizes in addition to allowing for a tiltable table. In addition, the larger aperture facilitates replacing a worn or broken blade with a new one. For this reason, a table insert is generally placed over the table aperture to cover the void. A typical table insert for a commonly available scroll saw is made from plastic or metal, is circular in shape and measures approximately 2 19/32 inches in diameter and about 3/32 inches in thickness.

During the operation of the scroll saw, pressure on the workpiece tends to deform the blade. The operator pushes the workpiece into the blade. This pressure deforms the blade in the longitudinal direction. The deformation results in less cutting accuracy and the additional stress on the blade reduces blade life.

In U.S. Pat. No. 6,272,964B1, Heilshov describes a throat plate blade guide for a band saw. The blade guide prevents lateral motion of the band saw blade with two blade guide structures juxtaposed on opposite sides of the band saw blade. Longitudinal motion of the blade is limited by means of a roller thrust bearing positioned at the rear of the blade slot. The roller thrust bearing is appropriate for a band saw blade, which only travels in a single direction. However, the blade of a scroll saw reciprocates, and a roller bearing would be inappropriate and result in shorter bearing life. The band saw blade is generally far less flexible than the scroll saw blade, due to the fact that the band saw blade is generally wider and made from thicker metal. In addition, the roller thrust bearing contacts the blade some distance (at least as great as the radius of the roller thrust bearing) below the point of contact between the blade and the workpiece. Because of this distance and the high degree of flexibility of the scroll saw blade, longitudinal motion of the blade continues to be a problem. In addition, a roller thrust bearing is expensive. Therefore, the roller thrust bearing would not perform as well with the more flexible and thinner scroll saw blade.

In U.S. Pat. No. 6,463,836, Snodgrass describes a blade guide for a band saw. The blade guide includes a wheel with a circumferential groove that is in continuous contact with the non-cutting edge of the band saw blade. This blade guide had the same disadvantages as the roller thrust bearing described in the preceding paragraph, and would not perform well with the scroll saw blade.

Therefore, heretofore known scroll saws suffer from the limitation that the blade can be flexed by the workpiece resulting in a degradation of cutting accuracy and a reduction in blade life. Existing table inserts and blade guides do not adequately solve the problem.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a table insert for a scroll saw that increases cutting accuracy and blade lifespan by preventing the longitudinal deformation of the scroll saw blade.

This object is met according to the present invention by a table insert blade positioner for insertion into a work table of a scroll saw having a scroll saw blade with a cutting edge and a non-cutting edge including a plate having a blade slot to permit a scroll saw blade to travel therethrough said plate insertable into the work table of the scroll saw, the plate having an upper surface and a lower surface; and a blade support structure attached to the lower surface of the plate for limiting the longitudinal motion of the scroll saw blade, wherein the blade support structure is positioned to make contact with the non-cutting edge of the scroll saw blade when sufficient pressure is exerted on the scroll saw blade in the longitudinal direction.

The inventive table insert blade positioner has the advantage that it effectively limits the flexing of the scroll saw blade in the longitudinal direction, increasing cutting accuracy and blade life. In addition, the inventive table insert blade positioner is inexpensive to manufacture.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a scroll saw showing the scroll saw blade, the work table, and the inventive table insert blade positioner seated within the work table aperture.

FIG. 2 is a top view of the prior art table insert.

FIG. 3 is a cross-sectional view of the prior art table insert of FIG. 2 along line 2-2 thereof.

FIG. 4 is a bottom view of the inventive table insert blade positioner.

FIG. 5 is a side view of the table insert blade positioner of FIG. 4.

FIG. 6 is a bottom view of an alternative to the inventive table insert blade positioner.

FIG. 7 is a side view of the table insert blade positioner of FIG. 6.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 shows a scroll saw machine **10** with a reciprocating scroll saw blade **12** extending through a table insert **14** and an aperture **16** disposed on a scroll saw work table **18**. In operation, a workpiece is placed on the top surface of the work table **18** and pressed into the blade **12**. For reference, mutually orthogonal direction vectors *x*, *y*, and *z* are shown. Direction *x* is side to side and also herein called the lateral direction. Direction *y* is the direction along which the workpiece is pressed into the scroll saw blade **12**. This is also referred herein as the longitudinal direction. Direction *z* is the direction along which the scroll saw blade reciprocates (up). Direction *z* is vertical.

FIGS. 2 and 3 show a typical prior art table insert **14** whose sole function is to provide a passage for blade travel without any control of lateral or longitudinal blade movement. As is apparent from FIGS. 2-3, the prior art table insert **14** is not the primary means to restrain either lateral or longitudinal

deformation of the scroll saw blade **12**. Notch **22** fits around a tooth (not shown) within the aperture **16** of FIG. 1 to prevent the table insert **14** from slipping within the aperture **16**.

Referring to FIGS. 4 and 5, there is shown the presently preferred embodiment of an inventive table insert blade positioner **14** for insertion into an aperture **16** disposed on a scroll saw work table **18**. FIG. 4 shows a bottom view of the table insert blade positioner **14**. The table insert blade positioner **14** comprises a table insert **26** having a blade slot **28** sized to permit a scroll saw blade **12** to travel therethrough. Notch **22** fits around a tooth (not shown) within the aperture **16** of FIG. 1 to prevent the table insert **14** from slipping within the aperture **16**.

A stop block **32** is positioned at the rear of the blade slot **28** for the purpose of preventing the longitudinal flexing of the scroll saw blade **12**. The stop block as shown is attached to a shaft **34**. The cylindrical shaft **34** having a principle axis slides longitudinally within the shaft guide **36**, allowing the user to adjust the position forward or rearward of the stop block **32**. Thus, the user can adjust the position of the stop block **32** such that it just barely contacts the non-cutting edge of the scroll saw blade **12** its most rearward position within the reciprocating stroke of the scroll saw blade **12**.

Preferably the front facing plane of the stop block **32** is a square, and the axis of the cylindrical shaft **34** intersects the center of the square. The shaft guide **36** has a threaded bore **38** disposed perpendicularly to the principle axis of the shaft **34** for insertion of a countersunk set screw **40**. The set screw **40** is tightened by the user to lock the position of the shaft **34** within the shaft guide **36**, thereby locking the position of the stop block **32**. It should be apparent to the reader that when the user places sufficient cutting pressure on the workpiece in the longitudinal direction, the non-cutting edge of the scroll saw blade **12** will be forced into contact with the stop block **32**. The distance along the scroll saw blade **12** (i.e. along the *z* direction) between the point of contact with the workpiece (i.e.

the top planar surface of the work table **18**) and the stop block **32** is only the thickness of the throat plate **24**. Preferably this distance is less than 0.25 inches. This small distance inhibits the flexing of the scroll saw blade **12**.

The stop block **32** may be non-limitedly formed from teflon, wood, plastic, fiberglass, metal, composite or similar materials having a low coefficient of friction.

With continuous use, the non-cutting edge of the scroll saw blade **12** might eventually wear a groove **26** aligned with the scroll saw blade **12** into the stop block **32**. The user can simply loosen the set screw **40**, slide the shaft **34** from the shaft guide **36**, rotate (preferably 90 degrees), then reinsert the shaft **34** into the shaft guide **36** and after positioning the stop block **32**, tighten the set screw **40**. Such an operation increases the life of the stop block **32**.

Preferably the stop block **32** is a prism or a cylinder in shape. A prism is a three dimensional shape having two congruent, parallel bases that are polygons. While the stop block **32** described in FIG. 5 preferably has a front facing plane that is a square, many other shapes will work well. In an example alternative, the front facing plane of the stop block is a circle such that the axis of the shaft **34** intersects the center of the circle. Then, when the non-cutting edge of the scroll saw blade **12** wears an excessively deep groove into the stop block **32**, the shaft **34** may be rotated about the axis of the shaft **34** a small amount so that the excessively deep groove will not align with the scroll saw blade **12**.

A slight groove **26** in the stop block **32** aligned with the scroll saw blade **12** actually can improve the performance of the table insert blade positioner **14** by limiting flexing of the scroll saw blade **12** in the lateral direction (in addition to the longitudinal direction as already described).

The stop block **32** shown in FIG. 5 is adjustable in the longitudinal direction (*y* direction) by means of an assembly including the shaft **34**, shaft guide **36** with hole **38** for a set screw **40**. Those skilled in the art will recognize that

alternatively, a second such assembly will additionally provide adjustability of the stop block **32** in the lateral direction (*x* direction).

The stop block **32** and the means for adjustment (shaft **34**, shaft guide **36**, and set screw **40**) comprise a blade support structure. As shown in FIGS. 4 and 5, the blade support structure is attached to the lower surface of the throat plate **24**.

FIGS. 6-7, an alternative table insert blade positioner **14** is shown. This alternative table insert blade positioner **14** has the advantage that the top surface of the stop block **32** is flush with the top surface of the work table **18** (and also is flush with the table insert 24). This reduces the distance along the scroll saw blade **12** (i.e. along the *z* direction) between the point of contact with the workpiece the stop block **32** to nil, thereby providing maximum limitation on the flexing of the scroll saw blade **12**.

FIG. 6 shows the blade slot **28** is large enough to accommodate both the scroll saw blade **12** and the stop block **32**. FIG. 7 shows a side view of the alternative table insert blade positioner **14**. The stop block **32** extends through the table insert **24**.

As is apparent from the above embodiment, the table insert blade positioner **14** resolves many of the deficiencies in the prior art. In particular, the table insert blade positioner **14** of the present invention will be disposed within the plane of the scroll saw work table **18** in close proximity to the workpiece. The table insert blade positioner **14** is inexpensive to manufacture, and provides excellent limitation of the unintended flexing of the blade in both the lateral and the longitudinal directions.

While an illustrative and presently preferred embodiment of the invention has been described in detail herein, it is to be understood that the inventive concepts may be otherwise variously embodied and employed and that the appended claims are intended to be construed to include such variations except insofar as limited by the prior art.

PARTS LIST

10 scroll saw

12 scroll saw blade

14 table insert blade positioner

16 aperture

18 work table

22 notch

24 throat plate

26 groove

28 1 blade slot

32 stop block

34 shaft

36 shaft guide

38 hole

40 set screw